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In re Patent Application of

HAAPANIEMI et al

Serial No. **09/367,108**

Filed: **August 10, 1999**

Atty. Ref.: **3952-6**

Group: **1772**

Examiner: **Patterson, M.**

For: **A STRUCTURAL PLY OF A PAPERBOARD CORE, A PAPERBOARD CORE MADE , AND A METHOD OF IMPROVING THE STIFFNESS OF A PAPERBOARD CORE**

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April 11, 2003

Honorable Commissioner of Patents
and Trademarks
Washington, DC 20231

APPEAL BRIEF

Sir:

Applicant hereby appeals the Examiner's "final" rejection of claims 18-23[1] in the Official Action dated December 30, 2002. As will become evident from the following discussion, the Examiner's art-based rejections are in error and, as such, reversal of the same is solicited.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee of the subject application, Ahlstrom Machinery Oy.

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II. RELATED APPEALS AND INTERFERENCES

The appellant and the undersigned are not aware of any related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 18-23 are pending in the subject application and have been "finally" rejected.

IV. STATUS OF AMENDMENTS

No amendments have been presented subsequent to the Official Action dated December 20, 2002.

V. SUMMARY OF INVENTION

The invention at issue is directed toward spirally wound paperboard cores. Specifically, the paperboard cores of the present invention include a plurality of structural plies made of paperboard manufactured by the press-drying process under simultaneous application of heat and pressure. At least one structural ply has a machine direction modulus of elasticity of at least 7500 MPa, and a cross machine direction modulus of elasticity greater than 4500 MPa. In addition, such at least one structural ply exhibits a squareness of less than 2.40, wherein the squareness is the ratio between the machine direction modulus of elasticity and the cross machine direction modulus of elasticity. (See, page 7, lines 10-25, and page 9, line 14 through page 10, line 1.)

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[1] The appealed claims are set forth in the Appendix hereto.

VI. ISSUES

The following issues are presented for purpose of this appeal:

(1) Has the Examiner erroneously rejected claim 18 under 35 USC §112, second paragraph as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention?

(2) Has the Examiner erroneously applied the proper statutory standards when rejecting claim 18-23 under 35 USC §103(a) as allegedly unpatentable over Qui et al (USP 5,505,395)?

VII. GROUPING OF CLAIMS

Claims 18-23 may be considered to be grouped as standing or falling together for purpose of this appeal.

VIII. ARGUMENT

(1) The Examiner has misapplied 35 USC §112, second paragraph in his rejection of pending claim 18.

Claim 18 has attracted a rejection under 35 USC §112, second paragraph based on essentially three allegations of indefiniteness; namely that: (a) the phrase "manufactured by a press-drying process under simultaneous application of heat and pressure" is indefinite; (b) the phrase "squareness is a ratio" (emphasis added) is indefinite; and (c) the abbreviation "MPa" is indefinite. As will become evident from the following discussion, each of these allegations is clearly erroneous. Therefore, the rejection of claim 18 as allegedly indefinite within the meaning of 35 USC §112, second paragraph must be reversed.

(a) The Phrase "Press-Drying" is a Well Known Term of Art

As was discussed in applicant's previous Amendment dated February 12, 2002, the art recognizes that the term "press drying" to be commensurate with what is also known as the "Condebelt method".[2] Several publications are of record herein which describe the Condebelt (press drying) method and make it abundantly clear that such terms refer to a *particular* technique well known to those skilled in the art.

Further evidence of the art-recognition of such terms exists. For example, the Board is referred to the following Princeton University web pages which evidence that the term "press drying" is recognized in the art to be directed to a specific process:[3]

http://www.wws.princeton.edu/cgi-bin/byteserv.prl/~ota/disk3/1984/8434/843403.PDF

http://www.wws.princeton.edu/cgi-bin/byteserv.prl/~ota/disk3/1983/8332/833209.PDF

http://www.wws.princeton.edu/cgi-bin/byteserv.prl/~ota/disk3/1984/8434/843406.PDF

The evidence is compelling. That is, the phrase "press drying" as employed in the applicants' claims is entirely definite within the meaning of 35 USC §112, second paragraph.

(b) The Phrase "Squareness is a Ratio" Is Not Indefinite

Applicants are somewhat perplexed by the Examiner's rationale with respect to the phrase "squareness is *a* ratio" (emphasis added). Particularly, the Examiner's comments in paragraph 3 of the Official Action dated December 30, 2002 seem to imply that the alleged indefiniteness would be cured by amendment to state "squareness is *the* ratio" (emphasis added).[4]

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[2] See Amended dated February 12, 2002 at page 3, ultimate paragraph bridging page 3.

[3] Hard copies of the text references found at such web pages are attached for convenience.

[4] This assumption is based on the Examiner's statement that the objected-to phrase is interpreted to mean "squareness is *the* ratio".

Applicants note in this regard that the term "ratio" only appears once in claim 18. That is, the only occurrence of the term "ratio" is in the phrase which has attracted the Examiner's criticism. Thus, to amend the phrase in a manner which would apparently satisfy the Examiner would necessarily introduce an antecedent basis problem with respect to the term "ratio" – that is, since the term "ratio" only appears in the phrase "squareness is a ratio". Hence, contrary to the Examiner's position, the phrase "squareness is *a* ratio" is entirely definite and proper within the meaning of 35 USC §112, second paragraph since to adopt the Examiner's apparent preference would necessarily introduce an antecedent basis issue into such a claim.

(c) The Abbreviation "MPa" Is Not Indefinite

Applicants are again somewhat perplexed by the Examiner's insistence that the well known abbreviation "MPa" for the pressure units MegaPascals is somehow indefinite within the meaning of 35 USC § 112, second paragraph. Although it is believed that the Board can take Official Notice of the fact that "MPa" means necessarily "MegaPascals", there are numerous technical glossaries and dictionaries which state the obvious. See in this regard, the following web page: http://www.hotrerice.com/pressure_78_81.pdf.[5]

The Examiner's position in this regard seems to be that the use of *any* well known abbreviation in the claims would give rise to indefiniteness under 35 USC §112, second paragraph. Surely, if such a position were in fact the law, then it would bring into immediate question the validity of literally thousands and thousands of issued U.S. patents that use such well known abbreviations as "^{0}F" and "^{0}C" to mean "degree Fahrenheit" and "degree Celsius", respectively, in the claims. Indeed, it is noted that a recent search of the USPTO web site[6] revealed a total of 4,586 U.S. patent issued since 1976 which had the exact term objected-to here, namely "MPa", in the issued claims.

[5] A hard copy of this web page is attached for the Board's convenience.

[6] http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=/netahtml/search-bool.html&r=19&f=G&l=50&co1=OR&d=ptxt&s1=MPa.ACLM.&OS=ACLM/MPa&RS=ACLM/MPa

Surely, it cannot be the Examiner's position that all such U.S. Patents are invalid under 35 USC §112, second paragraph. To be sure, applicants know of no authority, and the Examiner has not cited any, whereby notoriously well known abbreviations must necessarily be employed in a non-abbreviated form in order to satisfy the statutory requirements of 35 USC §112, second paragraph.

(2) The Examiner has applied an erroneous standard of review in rejecting claims 18-23 under 35 USC § 103(a) over Qui et al.

The problem solved according to the present invention is how to achieve a core that has better stiffness -- i.e. better beam strength to meet with the new demands of e.g. the printing presses. In other words, the applicants' goal was to achieve a core whose critical revolution is higher than in known cores. In the widest printing presses, which require a wider/ faster web, the inside diameter of the core has been changed to 150 mm in order to solve the vibration problem. So far, this arrangement has functioned well. Now, the same problem as with earlier machines, until transferring to 150 mm cores, will be faced again with the running parameters of the new machines being designed. In other words, the risky range of natural vibration of the rest reel will again be revisited.

For this reason, the stiffness of the core has to be increased in one way or another, while avoiding an increase in the inside diameter of the core. The solution the present applications have offered to these problems is to construct a multiply core having at least one ply that has been manufactured of coreboard made by a specific press drying method know as the Condebelt-method.[7]

Thus according to the present invention, the high value of the modulus of elasticity of the Condebelt board in the cross machine direction is an important factor in the present invention ***combined with*** the high modulus of elasticity in the machine direction. As the art of record evidences, however, board having a high modulus of elasticity in the machine

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[7] As noted previously, several articles describing the Condebelt (press drying) method were submitted during previous prosecution. In order to prevent overburdening of the Official Record, such articles are not being re-submitted with this Brief..

direction can be manufactured. But in such cases, the modulus of elasticity in the cross machine direction remains substantially low. In other words, those skilled in the art recognise the "fact" that, if a modulus of elasticity is made relatively high in one of the machine or cross machine directions it will be low in the other direction.

Applicants note that Qui et al discloses a cross machine direction modulus of elasticity of 0.53 M psi which corresponds *only* to 3660 MPa. The present invention, of course, specifically requires that the cross machine direction modulus of elasticity be ***greater than*** 4500 MPa. Hence, the structural ply of Qui et al does ***not*** inherently possess a cross machine direction modulus of elasticity as defined in the present applicants' claims.

Qui et al cannot therefore reasonably be considered to render obvious the present invention. In this regard, Qui et al merely discloses a multi-grade spirally wound paperboard winding core. The winding core of Qui et al has a central paperboard layer formed from lower density paperboard, and outwardly located structural paperboard layers formed from higher density paperboard. One main object of the Qui et al disclosure is to minimize the reduction of the inner diameter of paperboard winding cores ("ID comedown") under radial compression forces during a winding process. For this purpose, Qui et al provides multi-grade paperboard winding cores having a plurality of structural paperboard plies of different densities and strength. IN order to achieve an increased *radial* stiffness of the cores, structural plies having a high modulus of elasticity in the machine direction are provided.

Table 1 of Qui et al shows that the stiffness (modulus of elasticity) of the structural plies in the cross machine direction is by a factor of approx. 3.0 *smaller than* in the machine direction. For the relatively large winding angles a of the cores ($\alpha > 55°$ according to Qui et al (col. 8, lines 6-8), the stiffness of the structural plies in the cross machine direction has only a relatively small influence on the ID comedown. However, the stiffness of the structural plies in the cross machine direction determines the axial stiffness as well as the bending stiffness of the core under static and dynamic load.

Meanwhile, for the relatively large winding angles $\alpha > 55°$, the high stiffness of the structural plies in the machine direction of Qui et al hardly improves neither the axial stiffness nor the bending stiffness of the core under static and dynamic load.

As a result, the highly anisotropic properties of the structural plies according to Qui et al lead to a ***low axial stiffness and bending stiffness of the core*** as compared to its resistance to ID comedown. Therefore, paperboard cores according to Qui et al are not appropriate for applications where high axial and bending stiffness are required, e. g. by the running parameters of new printing presses.

In direct contrast to Qui et al as discussed above, the present invention provides a spirally wound paperboard core with a structural ply having a high axial stiffness and bending stiffness of the core, under static and dynamic load, without a need to change the core structure in any other way ***except*** for the raw material. In this regard, the "raw" material for the core are the plies that are wound into the core. As discussed immediately above, technical problem underlying the present invention is not addressed at all by Qui et al.

According to the present invention, the problem mentioned above is solved by, among other things, the definition of a target range for the squareness (< 2.4) of the structural ply along with a minimum modulus of elasticity in the cross machine direction of the structural ply ($E_{CD} \geq 4500$ MPa). Furthermore, in order to achieve these material properties, the structural ply is defined to be press-dried under simultaneous application of heat and perpendicular pressure to the moist paper.

Due to these technical features, the underlying technical problem is solved. In particular, the relatively low squareness, i.e. the relatively high isotropy of the structural ply leads to a high axial stiffness and bending stiffness of the core under static and dynamic load without a need to change the core structure in any other way except for the raw material.

An ordinarily skilled person would clearly not be directed to such technical features by the disclosure in Qui et al. Indeed, as noted previously, such an ordinarily skilled person would have been led directly away from the technical features of the present invention.

Applicants further note that Qiu et al teach in column 6, lines 11 through 15 that the mandrel extends at least substantially into the winding core, or fully through the core. This same arrangement is confirmed by Qiu et al at the top of column 11. This means in practice that the core of Qiu et al is not subject to bending, whereby it is clear that Qiu et al has not even considered the loads bending subjected to the core. Thereby, on the one hand, if someone is looking for an answer to problems originating from bending, he does not study Qiu et al. On the other hand if he were, such a person would not find the correct answers from Qiu et al, since Qiu et al do not teach at all the utilization of higher moduli of elasticity in cross machine direction.

It is also clear for a man skilled in the art (even for of one with substantially lesser skill, such as the undersigned) when looking at Fig. 1 of Qiu et al that the properties of the ply in the cross machine direction have nothing to do with the problem Qiu et al are discussing. Since the problem of Qiu et al was the decrease of the internal diameter of the core, the applicants can discern see only one thing that has to take place when the internal diameter decreases – namely, the plies have to be compressed in circumferential direction. In other words, the reduction in the diameter requires a corresponding decrease in the circumferential direction. Thus, the ply has to be compressed mainly in longitudinal direction thereof. To be able to fight such a compression, the plies (or at least some of the plies) must have a high modulus of elasticity. And, due to the wide winding angle, it is the MD modulus of elasticity that counts. Thus, Qiu et al has no need at all to consider the modulus of elasticity in cross machine direction.

The problem addressed by the present applicants' invention is totally different from that in Qiu et al. In this regard, as noted previously, the problem that needed to be

addressed by the present invention was the vibration of the core. What is the origin of the vibrations? It is slight bending of the core between the chucks. If one looks at Fig.1 of Qiu et al, and considers what kind of stresses bending of the core (radial load from above, for instance) creates, it is seen that the stresses are in the axial direction of the core, whereas the Qiu et al problem (radial compression from all over the circumference of the core) creates radial stresses. When the core is bent, or loaded from above, the underside of the core tends to stretch in axial direction, and correspondingly, the top side of the core tends to be compressed in axial direction. In other words, the only way to fight this problem would be to use plies having high modulus of elasticity in cross machine direction, as both the compression and stretching aim at deforming the ply mainly in its cross machine direction due to the wide winding angle.

This case can be approached in a somewhat different manner starting directly from the problem discussed in the applicants' specification. In this regard, the applicants talk about the vibrations on pages 2-4 of the specification. What the cited passages are saying is that, to be able to ensure that the specific vibration frequency of the core does not match the frequency of the rotation of the core, the core has to be made stiffer, whereby the specific vibration frequency will be increased. And, by stiffness, applicants mean resistance to bending. This can be exemplified by a ruler by means of positioning a ruler on a table such that, say the first 20 cm of the ruler hangs freely over the edge of the table, and making the ruler vibrate, and thereafter, vibrating the ruler after it is moved such that only 10 cm hangs over the table edge. It is easy to notice that the specific vibration frequency of the ruler, when the hanging part is shorter, is clearly higher. Though the ruler is the same, the relative stiffness of the ruler has been changed by changing the "free length" of the ruler. Thus it is again the cross machine direction modulus of elasticity that plays the important role in stiffening the core.

From the discussions above, it should be abundantly clear that Qui et al would not lead an ordinarily skilled person to the presently claimed invention. Indeed, Qui et al contains absolutely no suggestion that might possibly lead an ordinarily skilled person to

solve the problems confronted by the present applicants'. This should not come as any surprise since, as discussed above, Qui et al is not concerned at all with the same (or even remotely similar) problem addressed by the present invention.

Reversal of the rejection advanced under 35 USC §103(a) based on the Qui et al reference is therefore in order.

IX. CONCLUSION

All of the Examiner's rejections of the claims pending herein are in error and must be reversed. Such a decision is therefore solicited.

Respectfully submitted,

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APPENDIX

Claims on Appeal – USSN 09/367,108

18. A spirally wound paperboard core comprising a plurality of structural plies made of paperboard manufactured by a press-drying process under simultaneous application of heat and pressure, at least one said structural ply having a machine direction modulus of elasticity of at least 7500 MPa, and a cross machine direction modulus of elasticity greater than 4500 MPa, and wherein said at least one structural ply exhibits a squareness of less than 2.40, wherein the squareness is a ratio between the machine direction modulus of elasticity and the cross machine direction modulus of elasticity.

19. A paperboard core as recited in claim 18 wherein said at least one structural ply has a modulus of elasticity in the cross machine direction of greater than 5000 Mpa.

20. A paperboard core as recited in claim 19 wherein said at least one structural ply has a modulus of elasticity in the machine direction of greater than 8000 Mpa.

21. A paperboard core as recited in claim 20 wherein said paperboard core has a wall thickness of at least 10 mm, and an inside diameter of at 70 mm; and wherein said core has a paperboard ply located in the middle thereof, said middle paperboard ply having a width selected from the group consisting essentially of: if the core inside diameter is between 73-110 mm, at least 185 mm; if the core inside diameter is between 111-144 mm, at least 205 mm; if the core inside diameter is between 145-180 mm, at least 210 mm; and if the core inside diameter is between 181-310 mm, at least 220 mm; except that the maximum ply width is (π times the core diameter.

22. A paperboard core as recited in claim 18 wherein said at least one structural ply has a modulus of elasticity in the cross machine direction of greater than 6500 Mpa,

and wherein said at least one structural ply has a modulus of elasticity in the machine direction of greater than 8000 Mpa.

23. A paperboard core as recited in claim 22 wherein said paperboard core has a wall thickness of at least 10 mm, and an inside diameter of at 70 mm; and wherein said core has a paperboard ply located in the middle thereof, said middle paperboard ply having a width selected from the group consisting essentially of: if the core inside diameter is between 73-110 mm, at least 230 mm; if the core inside diameter is between 111-144 mm, at least 230 mm; if the core inside diameter is between 145-180 mm, about 350-450 mm; and if the core inside diameter is between 181-310 mm, about 350-500 mm; except that the maximum ply width is (π times the core diameter.